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1 Poster session: Constrained modifications of non-manifold B-reps   ◼
Guillaume Caumon, Charles H. Sword, Jean-Laurent Mallet
June 2003 **Proceedings of the eighth ACM symposium on Solid modeling and applications**

Full text available: 📄 pdf(2.88 MB)   Additional Information: full citation, abstract, references, index terms

Non-manifold boundary representations (b-reps) are increasingly used in Geosciences for a variety of applications (3D geographical information systems, basin modeling, geophysical processing, etc.). Meanwhile, the uncertainties associated with subsurface data make it desirable to modify such models efficiently.We present a method to deform locally a surface in a triangulated b-rep while maintaining a constant number of spatial regions in the model. This method does not require completely rebuild ...

2 Simulating facial surgery using finite element models   ◼
Rolf M. Koch, Markus H. Gross, Friedrich R. Carls, Daniel F. von Büren, George Fankhauser, Yoav I. H. Parish
August 1996 **Proceedings of the 23rd annual conference on Computer graphics and interactive techniques**

Full text available: 📄 pdf(549.30 KB)   Additional Information: full citation, references, citings, index terms

Keywords: data reconstruction, facial modeling, facial surgery simulation, finite element method

3 The Matrix revealed: Universal capture: image-based facial animation for "The   ◼
Matrix Reloaded"
George Borshukov, Dan Piponi, Oystein Larsen, J. P. Lewis, Christina Tempelaar-Lietz

July 2003 **Proceedings of the SIGGRAPH 2003 conference on Sketches & applications: in conjunction with the 30th annual conference on Computer graphics and interactive techniques**

Full text available: pdf(484.58 KB)   Additional Information: <u>full citation</u>

4 Linear light source reflectometry

Andrew Gardner, Chris Tchou, Tim Hawkins, Paul Debevec
July 2003 **ACM Transactions on Graphics (TOG)**, Volume 22 Issue 3

Full text available: pdf(12.74 MB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>

This paper presents a technique for estimating the spatially-varying reflectance properties of a surface based on its appearance during a single pass of a linear light source. By using a linear light rather than a point light source as the illuminant, we are able to reliably observe and estimate the diffuse color, specular color, and specular roughness of each point of the surface. The reflectometry apparatus we use is simple and inexpensive to build, requiring a single direction of motion for t ...

5 3D texture: Shell texture functions

Yanyun Chen, Xin Tong, Jiaping Wang, Stephen Lin, Baining Guo, Heung-Yeung Shum
August 2004 **ACM Transactions on Graphics (TOG)**, Volume 23 Issue 3

Full text available: pdf(1.40 MB) Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>

We propose a texture function for realistic modeling and efficient rendering of materials that exhibit surface mesostructures, translucency and volumetric texture variations. The appearance of such complex materials for dynamic lighting and viewing directions is expensive to calculate and requires an impractical amount of storage to precompute. To handle this problem, our method models an object as a shell layer, formed by texture synthesis of a volumetric material sample, and a homogeneous inne ...

Keywords: BTF, Texture mapping, mesostructure, reflectance and shading models, subsurface scattering, texture synthesis

6 Session P3: volume visualization I: Interactive translucent volume rendering and procedural modeling

Joe Kniss, Simon Premoze, Charles Hansen, David Ebert
October 2002 **Proceedings of the conference on Visualization '02**

Full text available: pdf(37.78 MB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

Direct volume rendering is a commonly used technique in visualization applications. Many of these applications require sophisticated shading models to capture subtle lighting effects and characteristics of volumetric data and materials. Many common objects and natural phenomena exhibit visual quality that cannot be captured using simple lighting models or cannot be solved at interactive rates using more sophisticated methods. We present a simple yet effective interactive shading model which capt ...

Keywords: procedural modeling, shading model, volume modeling, volume rendering

7 Realistic modeling for facial animation

Yuencheng Lee, Demetri Terzopoulos, Keith Walters

September 1995 **Proceedings of the 22nd annual conference on Computer graphics and interactive techniques**

Full text available: pdf(681.19 KB) ps(4.37 MB)   Additional Information: full citation, references, citings, index terms

Keywords: RGB/Range scanners, discrete deformable models, facial animation, feature-based facial adaptation, physics-based facial modeling, texture mapping

8 Synthesizing realistic facial expressions from photographs

Frédéric Pighin, Jamie Hecker, Dani Lischinski, Richard Szeliski, David H. Salesin

July 1998 **Proceedings of the 25th annual conference on Computer graphics and interactive techniques**

Full text available: pdf(276.04 KB)   Additional Information: full citation, references, citings, index terms

Keywords: facial animation, facial expression generation, facial modeling, morphing, photogrammetry, view-dependent texture-mapping

9 User interfaces: Management and visualization of large, complex and time-dependent 3D objects in distributed GIS

S. Shumilov, A. Thomsen, A. B. Cremers, B. Koos

November 2002 **Proceedings of the 10th ACM international symposium on Advances in geographic information systems**

Full text available: pdf(856.25 KB)   Additional Information: full citation, abstract, references, index terms

This paper presents solutions for architectures of distributed GIS employed for large scale geological modeling in contrast with more traditional GIS. Key technologies are proposed for dealing with complex geological spatio-temporal 3D models. These techniques are then illustrated on a prototype system developed to support interactive work on large models employed by existing geological 3D modeling tools. This prototype has already been successfully applied to the construction of large 3D and 4D ...

Keywords: 3D/4D geological modeling, CORBA, Java, VRML, VTK, animation, data selection and retrieval, distributed spatial databases, mesh decimation, open GIS, progressive transmission, temporal spatial data, visualization

10 Mesh parameterization: Painting detail
Nathan A. Carr, John C. Hart
August 2004   **ACM Transactions on Graphics (TOG)**, Volume 23 Issue 3

Full text available: pdf(25.68 MB)   Additional Information: full citation, abstract, references

Surface painting is a technique that allows a user to paint a texture directly onto a surface, usually with a texture atlas: a 1:1 mapping between the surface and its texture image. Many good automatic texture atlas generation methods exist that evenly distribute texture samples across a surface based on its area and/or curvature, and some are even sensitive to the frequency spectrum of the input texture. However, during the surface painting process, the texture can change non-uniformly and unpr ...

Keywords: 3D painting, Mesh parametrization, face clustering, texture atlas

11 Skinning: EigenSkin: real time large deformation character skinning in hardware
Paul G. Kry, Doug L. James, Dinesh K. Pai
July 2002   **Proceedings of the 2002 ACM SIGGRAPH/Eurographics symposium on Computer animation**

Full text available: pdf(5.22 MB)   Additional Information: full citation, abstract, references, citings, index terms

We present a technique which allows subtle nonlinear quasi-static deformations of articulated characters to be compactly approximated by data-dependent eigenbases which are optimized for real time rendering on commodity graphics hardware. The method extends the common Skeletal-Subspace Deformation (SSD) technique to provide efficient approximations of the complex deformation behaviours exhibited in simulated, measured, and artist-drawn characters. Instead of storing displacements for key poses (...

Keywords: hardware rendering, pose-space deformation, principal component analysis, skeletal-subspace deformation

12 Deformable objects: Point based animation of elastic, plastic and melting objects
M. Müller, R. Keiser, A. Nealen, M. Pauly, M. Gross, M. Alexa
August 2004   **Proceedings of the 2004 ACM SIGGRAPH/Eurographics symposium on Computer animation**

Full text available: pdf(305.14 KB)   Additional Information: full citation, abstract, references, index terms

We present a method for modeling and animating a wide spectrum of volumetric objects, with material properties anywhere in the range from stiff elastic to highly plastic. Both the volume and the surface representation are point based, which allows arbitrarily large deviations form the original shape. In contrast to previous point based elasticity in computer graphics, our physical model is derived from continuum mechanics, which allows the specification of common material properties such as Y ...

13 <u>Articulated body deformation from range scan data</u>

Brett Allen, Brian Curless, Zoran Popović

July 2002 **ACM Transactions on Graphics (TOG) , Proceedings of the 29th annual conference on Computer graphics and interactive techniques,** Volume 21 Issue 3

Full text available: <u>pdf(2.84 MB)</u>   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

This paper presents an example-based method for calculating skeleton-driven body deformations. Our example data consists of range scans of a human body in a variety of poses. Using markers captured during range scanning, we construct a kinematic skeleton and identify the pose of each scan. We then construct a mutually consistent parameterization of all the scans using a posable subdivision surface template. The detail deformations are represented as displacements from this surface, and holes are ...

Keywords: animation, character animation, deformation, human body simulation, synthetic actor

14 <u>Displacement mapping using flow fields</u>

Hans Køhling Pedersen

July 1994 **Proceedings of the 21st annual conference on Computer graphics and interactive techniques**

Full text available: <u>pdf(240.29 KB)</u> <u>ps(1.55 MB)</u>   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

Existing displacement mapping techniques operate only in directions normal to the surface, a restriction which limits the richness of the set of representable objects. This work removes that restriction by allowing displacements to be defined along curved trajectories of flow fields. The main contribution of this generalized technique, which will be referred to as flow mapping, is an alternative model of offset surfaces that extends the class of shapes that can be modelled ...

15 <u>Dynamics & modeling: BD-tree: output-sensitive collision detection for reduced deformable models</u>

Doug L. James, Dinesh K. Pai

August 2004 **ACM Transactions on Graphics (TOG),** Volume 23 Issue 3

Full text available: <u>pdf(425.47 KB)</u>   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>index terms</u>

We introduce the Bounded Deformation Tree, or BD-Tree, which can perform collision detection with reduced deformable models at costs comparable to collision detection with rigid objects. Reduced deformable models represent complex deformations as linear superpositions of arbitrary displacement fields, and are used in a variety of applications of interactive computer graphics. The BD-Tree is a bounding sphere hierarchy for output-sensitive collision detection with such models. Its bounding sphere ...

Keywords: collision, deformable, output-sensitive, sphere trees

16 Precomputing interactive dynamic deformable scenes

Doug L. James, Kayvon Fatahalian

July 2003   **ACM Transactions on Graphics (TOG)**, Volume 22 Issue 3

Full text available: ⬛ pdf(10.39 MB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>index terms</u>

We present an approach for precomputing data-driven models of interactive physically based deformable scenes. The method permits real-time hardware synthesis of nonlinear deformation dynamics, including self-contact and global illumination effects, and supports real-time user interaction. We use data-driven tabulation of the system's deterministic state space dynamics, and model reduction to build efficient low-rank parameterizations of the deformed shapes. To support runtime interaction, we als ...

Keywords: deformations, natural phenomena animation, physically based animation, physically based modeling

17 Image metamorphosis using snakes and free-form deformations

Seung-Yong Lee, Kyung-Yong Chwa, Sung Yong Shin

September 1995   **Proceedings of the 22nd annual conference on Computer graphics and interactive techniques**

Full text available: ⬛ pdf(677.68 KB) ⬛ ps(1.08 MB)   Additional Information: <u>full citation</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

Keywords: image metamorphosis, morphing, multilevel B-spline interpolation, multilevel free-form deformation, snakes

18 Poster Session: Deformation of finite element meshes using directly manipulated free-form deformation

Norbert Frisch, Thomas Ertl

June 2002   **Proceedings of the seventh ACM symposium on Solid modeling and applications**

Full text available: ⬛ pdf(704.19 KB)   Additional Information: <u>full citation</u>, <u>abstract</u>, <u>references</u>, <u>citings</u>, <u>index terms</u>

CrashViewer [5, 18] is a tool for visualizing car crash simulation input and output data consisting of nite element meshes. For a shorter work ow, a feature for local deformation of the car components represented by FE meshes is desired. This feature allows to quickly make minor corrections and enhancements directly on the FE mesh. The roundtrip through the CAD department and the remeshing of the CAD representation is avoided. The crash simulation can be started immediately with the modified car ...

Keywords: CAD, free-form deformation, nite elements

19 Simple constrained deformations for geometric modeling and interactive design ▬

Paul Borrel, Ari Rappoport
April 1994 **ACM Transactions on Graphics (TOG)**, Volume 13 Issue 2

Full text available: 📄 pdf(9.28 MB)   Additional Information: full citation, abstract, references, citings, index terms, review

Deformations are a powerful tool for shape modeling and design. We present a new model for producing controlled spatial deformations, which we term Simple Constrained Deformations (Scodef). The user defines a set of constraint points, giving a desired displacement and radius of influence for each. Each constraint point determines a local B-spline basis function centered at the constraint point, falling to zero for points beyond the radius. The deformed image of any point in ...

Keywords: B-splines, constraints, deformation, geometric design, geometric modeling, interpolation, spatial deformation

20 Deformable objects: Quasi-rigid objects in contact ▬

Mark Pauly, Dinesh K. Pai, Leonidas J. Guibas
August 2004 **Proceedings of the 2004 ACM SIGGRAPH/Eurographics symposium on Computer animation**

Full text available: 📄 pdf(491.41 KB)   Additional Information: full citation, abstract, references, index terms

We investigate techniques for modeling contact between quasi-rigid objects - solids that undergo modest deformation in the vicinity of a contact, while the overall object still preserves its basic shape. The quasi-rigid model combines the benefits of rigid body models for dynamic simulation and the benefits of deformable models for resolving contacts and producing visible deformations. We argue that point cloud surface representations are advantageous for modeling rapidly varying, wide area c ...

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